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ABSTRACT

The fundamental differences between traditional print and hypertext are likely to cause a shift in pedagogy. Hypertext radically alters traditional hierarchical structures both within writing systems and between author and reader. Hypertext engages users in qualitatively different activities than traditional print. Also, hypertext has been called a democratizing medium because it allows everyone access both to production and decoding. Hypertext allows no marginalization--whatever text is on the screen is the primary text of the moment. Hypertext has no hierarchy of ideas, and it displays a kinetic structure as opposed to the static structure of traditional print. Another pedagogical implication of hypertext is that the teacher must relinquish some measure of control, altering the relationship between student and teacher. Teachers no longer have control over who will read what texts, when, or in how much depth. One problem with hypertext technology is that it can be programmed to lead the reader in as structured a way as traditional print does. Another problem is that of access--many inner city schools do not have funds to provide computers to their students. Hypertext encodes a new worldview--it both allows and encourages more genuine participation by students, and it calls into question several different relationships of academic authority. Whether the emergence of hypertext will result in a pedagogical shift remains to be seen, but educators will likely be examining the impact of hypertext for some time to come. (Contains 20 references.) (RS)

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The Pedagogy of Hypertext

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Over the last couple of years hypertext has gained tremendous acceptance in general cultural use. Not only has hypertext fiction seen major attention in national newspapers, but hypermedia in advertising has found a comfortable niche in the world of commerce. Buick will send you a disk describing their new cars. What arrives for the Macintosh is a hypermedia package apparently written in Macromind Director which allows you to examine every new model car and its specifications, compare it to similar models from other auto makers, and even stroll through Buick's history. It also contains a game. This year's game is conceptually linked to the rest of the package -- it is a quiz using the information the reader has read in the remainder of the package. Last year's game was not linked to the remainder of the package -- it was a golf game -- showing that Buick has learned a lesson about making connections. In the world of education Macintosh publishes a catalog over one inch thick detailing hypermedia projects underway in various disciplines in academic institutions around the country. The existence of this panel at a Speech Communications Association Convention is also evidence of the more general acceptance of hypertext.

Twenty six years ago the University of Maryland in Baltimore County was built without a computer science building because very few people were interested in the obscure discipline of computers. In his 1980 landmark study of the uses of computers in children's classrooms, Seymour Papert insisted that children can and do learn faster and more extensively when given the opportunity to discover for themselves the ideas made available through the interactive computer environment. Many school children at many levels have, in the years since Papert's book, learned to use computers for a wide variety of applications. Kindergartens through advanced graduate programs across the country are installing computer labs. Some colleges dispense laptop computers to entering freshmen at their initial registration and databases larger than encyclopedia are now being entered in hypertext. Hypertext is no longer the domain of only the media lab. It can be found in classrooms and libraries, business and research laboratories. Many libraries are themselves becoming large hypermedia systems. From my desk at the University of Baltimore I can access, for instance, the Uncover system with which I may examine the tables of contents of over ten thousand academic journals. The internet system allows most people in this room not only to communicate with one another but to rapidly perform research which would have taken years not too long ago. Large databases are being assembled for uses in a wide variety of disciplines. The Perseus project, for example, offers an immense database of hypermedia about all aspects of ancient Greece. Perseus is an enormous project, with major funding from a number of sources, and an

ongoing evaluative process attached to it. Smaller projects are being produced and experimented with all over the country.

In this paper I am principally concerned with the pedagogical significance of hypermedia in education; but there will also be much to be said about the impact of this new technology on the contemporary paradigm of American thought. Many scholars have examined the pedagogical implications of various teaching tools. Much has been written about the agendas, hidden and overt, of different types of textbooks. In her important 1979 study, Frances FitzGerald makes a clear case that textbooks reflect prevailing states of thought. Earlier Paolo Friere (1970) made a powerful argument that classroom agendas are integrally tied to political agendas. In the years since these works this issue has been addressed scholars in many disciplines (e.g.: Knoblauch and Brannon, 1984; English, 1986; Gagnon, 1987; Kaplan, 1991). And designers of hypertext and hypermedia packages are concerned with the differences between their products and traditional texts assigned for classroom use (Crane & Mylonas, 1988; Crane, 1990; Newman, 1991). A number of scholars have already begun to address the question of how hypertext and hypermedia differ from traditional printed text in their epistemological, ideological, political and cultural biases (Bolter, 1991; Kaplan, 1991; McDaid, 1991; Moulthrop, 1991; Slatin, 1991). Many of these scholars also investigate how the hypertext environment differs from that of the traditional computer environment (Herrstrom & Massey, 1989; Rubens, 1989; Smith, 1991). The implications of all these differences for educational uses of hypertext are of major significance. I examine the important question of what epistemological agendas find expression through hypertext and the pedagogical implications contained therein.

O.B. Hardison (1989) maintains that hypertext is part of a natural progression -- literary, social and technological -- wherein American culture is slowly disconnecting from its history and floating into paradigmatic isolation. George Landow (1992) on the other hand sees the "convergence of contemporary critical theory and technology," subtitling his book thusly. McDaid (1991) maintains that nothing less than the transformation of consciousness is at stake in a relationship with hypertext. And Jay Bolter, our respondent, (1991) says that hypertext will alter the manner in which realities are constructed. Hypertext radically alters traditional hierarchical structures both within writing systems and between author and reader. It is in this alteration in the relationship between author and reader that the fundamental differences lie between traditional print and hypertext and these differences seem likely to cause a shift in pedagogy.

I address three issues about hypertext here. First, the question of how if differs from traditional print. Second, the issue of how it functions in the classroom. Third

some problems which arise when hypertext is introduced into the classroom. Finally I also make some broad suggestions about the future, such as it is.

It may be difficult to conceptualize how radically different hypertext is from traditional print in the activities it requires of the intellect. I maintain that they engage us in qualitatively different activities. In the world of physics there comes a point, sometimes even a visible instant, when changes in quantity become changes in quality. For example this happens when I keep adding heat to water, making the water hotter and hotter until a transforming event occurs and I no longer have just hotter water, but I have a substance of a totally different form. This is the point at which the hot water becomes steam. A transformation in form has clearly taken place, yet the two substances are composed of the same content. A similar transformation occurs with technology. As I alter one technology to make a new one they may at first similar, but experience shows us that they call into play very different skills. We know now that television is not just radio with pictures. It is a different medium with which we engage in an entirely different way from radio. A horseless carriage (we usually begin by calling a new technology by an altered version of the old technology's name) is not simply a vehicle that moves without benefit of animal power -- it calls into being a completely new set of attitudes about who we are and our position in the universe.

The same transformation is in play with hypertext. It is not simply a larger book. I offer just a few of the physical differences between hypertext and traditional print. It contains more, covering the ground that could be covered by hundreds of books in a single hypermedia package. This means you do not have to get up and go to another book when you need to examine another text -- a single keystroke calls a new text to the screen. It can contain different modes: printed text, photos, animation, video, diagrams, sound. It can keep track of where you've been. It can make connections between a piece of text and more than one other piece of text: in other words one node can connect to several other nodes in a way that traditional print (which just moves linearly from one page to another) can't. There is no artifact, or rather the artifact is unknowable. And frequently the medium is write-to as well as read -- meaning any reader can add commentary which then becomes part of the text.

All these differences combine to create a different animal -- not just a larger book or a more convenient to use book. The fact that one does not have to get up and leave ones desk, that all information in the body of the text is available at the touch of a single key, differentiates it from traditional print. Traditionally doing research requires getting up, leaving ones desk, going to another part of the library, or sometimes even a different library. Hypertext encourages an altogether different engagement than does traditional

print. Interacting with hypertext summons different cognitive skills and social skills, and embodies different political and Ideological biases. The different habits of thought encouraged by hypertext have new pedagogical implications. Hypertext encourages different teaching habits, different learning styles, and different engagements between teachers and students.

What are some of these differences? How hypertext functions in the classroom is my second point. I'd like to discuss several points. Hypertext has been called a democratizing medium and this is integrally linked to a sense that there is a shift of responsibility when hypertext is part of classroom interactions. While I examine these two aspects separately, I do not mean to imply by this that they may be separated from one another conceptually.

What is meant when calling hypertext a democratizing medium. is that it allows everyone access both to production and decoding. Hypertext is democratizing both internally and within its larger environment. First the internal qualities.

One significant characteristic of hypertext is its ability to show interconnectedness (Slatin, 1991). This, in combination with the possibility of enormous databases, allows hypertext authors to show that various concepts are linked to one another. While this is not completely impossible in print, it is structurally difficult to include massive amounts of material in a single text. It also goes against all accepted authoring practice; the idea behind composing text is, for the most part, to exclude anything that might be only marginally relevant and to include only that which is directly pertinent. In particularly large traditional textbooks, one odd characteristic is that it is difficult to show connections among all the disparate material complied within. In authoring a hypertext it is possible to allow the text to branch in several directions at once, representing many relevant paths of thought. As a result, ideas can be contextualized historically as well as theoretically in ways impossible in traditional print.

One impact of this characteristic is that hypertext allows no marginalization. Whatever text is on the screen is the primary text of the moment. No text node has any more or less significance than any other node of text. The idea of marginalization is important in our culture, many groups -- including students -- have complained of feeling shoved out of the mainstream. One can imagine that when this can no longer be accomplished in text, the idea of marginalization may slip away. In hypertext, every writers thoughts are equally significant. No contributor is relegated to the margin when whatever is summoned to the screen becomes primary. There are no handwritten comments to appear as thought which came later, everything appear in the same way. There is, in fact, literally no margin in which to write even if one wanted to. In hypertext

there are often pieces of what would be several different texts included in the body of the hypertext. Each one having equal importance. And in the case of a write to program, comments added by the reader/user are suddenly equal to the original text. And, in fact, these comments become part of the "original" text for the next reader.

Another democratizing characteristic of hypertext is that there is no hierarchy of ideas. Like the lack of margins, there is no conceptual ordering of ideas where one idea comes before another idea. The organizing principal of hypertext is a web and not an ordered list, hence the idea that one concept is more significant than another is challenged. Ideas or pieces of text are spread out in a manner that shows their, not their order of importance. This also calls into question the notion pr prerequisite knowledge. In hypertext the reader can very likely go anywhere she desires in the text. In the Perseus project, for instance, there is no part of the text that must be read first before another part of the text can be understood. All texts are equally important, equally integral to the whole, and no one piece controls intellectual access to any other.

Also democratizing is the fact that hypertext displays a kinetic structure as opposed to the static structure of traditional print. The text moves about on the screen, nodes of text actually disappearing from the reader's view and reappearing later when summoned again. A traditional printed book always looks the same; it sits on the desk and doesn't change. While a reader may look at different pages, the object is always in the same order, covered by the same cover and offered to the world as the exactly same object. Hypertext is a dynamic environment. This movement implies a living text which can be altered. A static text is finished, and admits no alterations. A kinetic text may be amended continually to include additional points of view. Walter Ong and Jay Bolter both refer to the idea that traditional print implies that the subject is covered, finished. Hypertext implies that everything can never be known about a single subject and that there is always a place for change and challenge.

A more democratized environment internally sees a shift of responsibility in the macro environment as well. This is also manifested in several significant ways. There is a shift of responsibility away from the writer of the text. In traditional print the writer commits her text to paper, sends it out into the world and that is that. While it is certainly possible for readers to read traditional print text in any order, the request of the artifact is clear: "read me in the order I am arranged." The text arrives with a linear structure. In hypertext the text arrives perhaps with a starting place, but after this node the reader usually has several choices as to where she wants to travel next. In this format the reader must now take on some of the responsibility for constructing the text. It is no longer possible to say "McDaid wrote a bad novel" because the reader has done part of

the composing. If I don't like a book I read in hypertext I must understand that I made some of the choices. Constructed in a different way the story would have been different. When the reader constructs the text it is no longer possible to hold the author entirely responsible for what one reads.

Responsibility is also shifted in the classroom. The pedagogical implications of hypertext are that the teacher must relinquish some measure of control and as a result of this the relationship between student and teacher is altered.

When using a hypertext package as an adjunct to a course the student will have access to material not traditionally available in both volume and structure. While it is certainly possible for students to skip ahead in textbooks, it is not often that they do this, usually because they have no way of knowing what in the subsequent tat is linked conceptually to what they are presently reading. Traditional printed text signals to students: this is what will be covered in class and usually in this very same order. Not so with hypertext.

When students are using a traditional print textbook they have access to only what the textbook writer or editor has provided. In using a hypertext students have access to whatever is in the database, and this is usually significantly more material than is made available to readers of print. Not only is more material available, but this is frequently material used in preparation of the course. In other words, it is primary text material. This is material that is almost never made available to students as a matter of course. But in a hypertext database it is highly accessible to them. The teacher no longer has control over who will read what texts, when, or in how much depth. This is not to say that these primary texts have heretofore been unavailable to students if they search for them. But that is the key phrase -- searching was necessary. Not many typical students exhibit this type of interest in their course material. When a body of literature is right at their fingertips, however, the question of exploration is different. When students have access to primary material, and are shown through connective links the structure of hypertext they can see conceptual maps that teachers frequently keep private. Some of the information they may even be reading may be contrary to paradigm or conceptual agenda of the course. They may now pursue on their own links among ideas that may or may not be planned as a part of the course material. If they are part of the course, students may be ahead of the class progression and ask questions which anticipate these links. If they are not planned as part of the class material, students may force the issue, making the instructor examine ideas she had originally planned not to cover. Unless a teacher is prepared to dictate each time she is confronted with an unexpected question student

access to hypertext material will force teachers to deal with material they may not have planned for in a time not their own.

When the student has access to material in this fashion the teacher must relinquish some of the classroom control. A result of this is that the relationship between the student and the teacher is radically altered. No longer is the teacher the final arbiter of what the student may connect to other ideas offered in the classroom. It is important to reiterate here that, while students have never been denied access to material, it has historically be unlikely that any significant number of them would take the trouble to research what a hypertext database makes available to them sitting in their dormitory desk chairs. The alteration of this relationship is one of the primary factors in driving the new pedagogy embedded in hypertext.

This altered relationship mirrors the internally democratizing elements of hypertext. When there is no marginaliztion no student need feel less important not only than any other student, but than any other writer. Traditional hierarchical structure of the classroom is called into question by the possibility of student access to texts not normally available to students. When students have control of what they can read they also have control of what connections they will make. This is not even to consider the vast database which is becoming available to students on the internet. The internet web is even more mammoth than most university libraries ever ambitions of being, offering connections and resources that would have taken a researcher using traditional print years to assemble, including connections and possibilities that might not even have been thought of. Suddenly every student is privy to the world of the advanced researcher. In fact, access is frequently easier for students who, with their backgrounds in computer play, are more adept at navigating the deep space of the internet than their professors.

What ideas about teaching are embedded in the technology of hypertext? Relationships in the classroom are altered. So is the structure of how people interact with each other and their material, what the teacher can and cannot do, and what she may expect of her students. Some have even suggested that hypertext will bring with it a paradigm shift as radical as that ascribed to the shift from manuscript to print (Bolter, 1991; Kaplan, 1991; Landow, 1992; McDaid, 1991).

Charles Ess (1991) indicates that students gain a better idea of connectedness, and the ability to grasp highly complex material when working with hypertext as opposed to traditional printed textbooks. It would seem from the characteristics of hypertext that this would be indicated. Hypertext's ability to democratize the classroom by showing interconnectedness, not marginalizing less popularly held points of view, having no embedded hierarchy all argue for a more open classroom where students feel free to ask,

and also answer, questions. The kinetic characteristics of hypertext seem to lend themselves to showing students that the world is constantly evolving and that knowledge is not carved in the proverbial stone. Hypertext lends itself to collaborative learning: techniques where the students are engaged on a fundamental level with the text, with each other, and with the teacher. In learning where students are allowed to discover connections and realities for themselves we have seen a more complete grasp of material and a greater interest in continuing to learn.

This all argues well for the presence of hypertext in education. But it is also necessary to examine some of the problems which are possible with this technology. Not all hypertext is as free as I have described. It is certainly possible to program a hypertext so that it leads the reader in as structured a way as traditional print does. They can be more structured, in fact, since in traditional print the reader is free to skip from any one page to any other page. In a computer environment, it is possible to program the users every move. This does go against the principal of what most hypertext authors maintain as the medium's intention. Many of these authors state that the nature of the medium is to fight against this type of constraint. Nevertheless, it is possible to lead a reader in hypertext in a manner inconceivable in print and I have seen several hypertexts that do just this. In hypertext the reader has no concept of what she is not seeing because the artifact shows neither size nor content. This type of hypertext is every bit as deadly boring as the traditional printed text with questions at the end of each chapter quizzing a somnambulistic reader on the contents therein. Neither does every hypertext exist in a write-to mode, in fact few hypertexts allow the reader to contribute. In spite of all that is written about the marvels of allowing readers to add text, create new links and alter existing paths, few hypertexts allow the reader to do any of this. Even in composition programs, where these types of contributions are invaluable, not all programs in use allow them. When the text leads the reader on a predetermined path, does not allow contributions, alterations or wanderings, there is certainly a sense of hierarchy -- the text is in charge and the text will tell the reader what is important. In some highly structured hypertext environments readers may still have the illusion of constructing the text, but when a choice is path A or path B and the end of the path is always the same stroll through the text this choice is a deception, making this type of hypertext suspect. Is it worse to have no choice, or to have the illusion of choice?

Without the mutability which is characteristic of the hypertext most people discuss there is certainly an epistemological attitude of a body of knowledge being "covered" completely -- no questions need be asked nor are they, quite literally, permitted.

When hypertext is constructed in this way the responsibility shift spoken of here does not occur. The teacher need relinquish no control, she has just as much as always. She controls the text, how much students may read and where they may wander. She controls what contributions they may make to class.

Finally I feel compelled to cite an enormously important problem, all too often ignored: that of access. While the computer culture is certainly upon us and it seems safe to say that everyone in this room probably has access to a computer, not everyone in the country does. Many primary and secondary school systems in the inner cities do not have funds to provide computers for their students; those that do frequently find themselves with several students having to share a single station. This is not access. Nor is it a problem that can be addressed by the technology. No alteration in the approach of the software can usefully accommodate more than one reader at a time; students need to move at their own speed and be able to explore the nooks and crannies of hypertexts that have significance for *their* questions. Access is, of course, an economic and political issue which must be addressed on those levels. But that does not absolve educators of the responsibility for dealing with it. As technology separates the haves from the have-nots with a wider and wider chasm we begin to produce a bi-leveled culture even more deeply at odds with itself than the one left in the wake of the industrial revolution. Access remains a problem and we must not allow ourselves to be blind to that fact.

In spite of these possible "mis" uses, hypertext does encode a new worldview, different from that of traditional print. I have discussed the primary differences between the two. Pedagogically, hypertext both allows and encourages more genuine participation by students. It also seems to open up the classroom in ways encouraged by all that has been written about collaborative learning. Whether or not teachers will be willing to give up some control of their classrooms is a question similar to that brought about by the introduction of the printing press. The academy hated seeing authority shifted, but it was as inevitable as sunrise. Not knowing what may happen in a particular class is uncomfortable and requires a flexibility and a range of material many instructors may be unwilling to embrace. As hypertext breaks down the barriers between disciplines by contextualizing bodies of knowledge historically and conceptually it will demand a more well-rounded classroom that admits not only opposing points of view but points of view from seemingly disparate fields. Faculty will be forced to adapt, and we have already seen the results of this in newly formed interdisciplinary departments and schools.

Hypertext will also have an impact on an epistemological scale larger than classroom pedagogy. It calls into question several different relationships of academic authority. Not only will instructors in individual classrooms have their authority

challenged, but the larger ideas of curriculum and canon will be forced to account for themselves in ways heretofore unimagined. The wider contextualization allowed by hypertext will most certainly force changes in the manner in which disciplines are conceived and expertise is attributed. When the text is mutable, all notions about authority and authorship are changed.

The habits of thought encouraged by this dynamic and visual environment are already apparent in our culture in the guise of, for example, MTV and computer games. Rhetorical traditions will be severely challenged by this. It has become convention now that what is possible visually, whether or not it is logical, is expected. Whether or not it makes traditional and logical sense in the world of the real no longer demands the imperative consideration it used to.

We are already seeing the impact of hypertext both in the classroom and in the culture. Many of our children are more computer literate than we are; and certainly they are less intimidated by the possibilities of computers than we were at their age. Will this be a democratizing medium as so many think, or will it simply produce a nation of people with short attention spans and good eye hand coordination, as others contend? I am in favor of anything that asks us to examine our traditional agenda. Particularly when that agenda has been, for the most part, a hidden one. Whether the emergence of hypertext will result in a pedagogical shift remains to be seen, probably not by us. But I suspect we shall all be examining these questions for some time to come.

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